ML for Ramsey Games
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Here is a list of games that we could try to build an ML for. The games are based on Ramsey Theory. They are not really fun.

1 Games Based on Graph Ramsey Theory

K_n is the complete graph on n vertices: so its n points and between each pair there is an edge.

1. RED and BLUE alternate coloring the edges of K_6. The first one to get K_3 in their color wins. It is known that the first player WINS. It is known that no matter how badly they play someone has to win (thats a Theorem in Ramsey Theory). Develop an ML to play it very well.

2. Same game as above but on K_5. Now if they both play badly then it could be a tie.

3. Same game only color the edges of K_{18} and you need a K_4 in your color.

4. Aside from K_3 and K_4 one can look at K_k, C_k (cycle on k vertices), P_k (Path on k vertices). One might even start out with a graph other than K_n.

Variants of the above:

1. Same as in the last set of games except this time the first player to get a the K_3 (or whatever) LOSES.

2. Same as in the last set of games except this time one of the players MAKER is trying to GET a mono K_3, while the other is just trying to BLOCK that from happening.

3. Either player can play RED or BLUE and he first one to FINISH a Monochromatic K_3 wins. Or loses.

2 Games Based on Van Der Warden's Theorem

1. RED and BLUE alternate coloring the numbers between 1 and 9. The first one to get an arithmetic sequence of length 3 in their color wins.

2. RED and BLUE alternate coloring the numbers between 1 and n. The first one to get an arithmetic sequence of length k in their color wins.

3. RED and BLUE alternate coloring the numbers between 1 and n. The first one to get numbers of the form $a, a + d, a + d^2$ in their color wins. (Or other patterns.)

4. Variants similar to the variants for Graph Ramsey.